IN THE UNITED STATES DISTRICT COURT
FOR THE EASTERN DISTRICT OF NORTH CAROLINA
WESTERN DIVISION
No. 5:23-cv-00493-FL

INTERDIGITAL, INC., INTERDIGITAL VC HOLDINGS, INC., INTERDIGITAL PATENT HOLDINGS, INC., and INTERDIGITAL MADISON PATENT HOLDINGS SAS, Plaintiffs, v. LENOVO (UNITED STATES) INC., MOTOROLA MOBILITY LLC, and LENOVO PC HK LIMITED, Defendants.	**JURY TRIAL DEMANDED**

LENOVO'S OPENING CLAIM CONSTRUCTION BRIEF

TABLE OF CONTENTS

TABLE OF AUTHORITIES

Page(s)

Cases

Statutes

TABLE OF EXHIBITS

Exhibit	Description
A	Richardson, The H.264 Advanced Video Compression Standard - LENOVO_EDNC_00004202 (excerpts)
B	Declaration of Dr. Orchard
C	EP2449683 File History - LENOVO_EDNC_00000436 (excerpts)
D	U.S. Patent 9,277,243 (“the ’556 Parent Patent”) - LENOVO_EDNC_00000185
E	’556 Parent Patent File History - LENOVO_EDNC_00002785 (excerpts)
F	U.S. Patent Application No. 2003/0219073 (“Lee”) - LENOVO_EDNC_00000203
G	U.S. Patent No. 11,089,337 File History - LENOVO_EDNC_00001989 (excerpts)
H	European Patent Application No. 07970824.5 – File History - LENOVO_EDNC_00003311 (excerpts)

I. INTRODUCTION

As part of the claim construction process, the parties ask the Court to resolve three disputes. First, the parties dispute the scope and limiting effect of the preamble of claim 10 of U.S. 8,674,859 ("'859 patent"). To identify the scope of the preamble, Federal Circuit law shows that transition terms, like "comprising," divide the claim into the preamble (preceding the transition term) and the separate claim body (subsequent to the transition term). No basis to depart from this customary practice exists here. Once the preamble is identified, the Court should deem the preamble limiting because it provides the antecedent basis for terms like "stream" that are also found in the claim body and the preamble gives life, meaning, and vitality to the claim because the preamble captures the heart of the invention for claim 10.

Second, the parties ask the Court to resolve a dispute about whether the specification provides sufficient structure to five claim terms of the '859 patent that are written in mean-plus-function format under 35 U.S.C. §112 ¶ 6. Because the '859 patent describes the corresponding structure in functional terms and shrouds the structure in black boxes, the '859 patent specification does not disclose sufficient structure. Consequently, the above captioned Defendants ("Lenovo") requests the Court hold that these terms (and their associated claims) are invalid because they fall short of the definiteness requirement of 35 U.S.C. § 112.

Third, the parties ask the Court to define the meaning of three disputed claim terms. As explained below, the patentee disclaimed certain interpretations of claim terms while prosecuting the patents. In this litigation, however, the above captioned Plaintiffs ("IDC") seeks to recapture that disclaimed claim scope. But IDC cannot say one thing to the patent office to secure patents then say another to the public when alleging infringement. With this principle in mind, Lenovo requests the Court construe the term "switching points" from the '859 patent as locations where "a probability model can be selected." For U.S. 9,674,556 ("'556 patent"), Lenovo requests the

Court construe "sparse de-noising filter" to exclude deringing filters in light of the prosecution history statements, as well as adopt a common-sense construction of "adaptive" to be consistent with "automatic."

II. APPLICABLE LEGAL PRINCIPLES

Claim Construction. Claim construction is a matter of law. *Markman v. Westview Instruments, Inc.*, 52 F.3d 967, 979 (Fed. Cir. 1995), *aff'd*, 517 U.S. 370 (1996). Claims should be given their ordinary and customary meaning as understood by a person of ordinary skill in the art, viewing the claim terms in the context of the entire patent. *See Phillips v. AWH Corp.*, 415 F.3d 1303, 1312-13 (Fed. Cir. 2005) (en banc)).[1] A patent's interpretation is guided first by the intrinsic evidence—claims, specification, and prosecution history—and then extrinsic evidence—such as expert opinion. The claims themselves provide substantial guidance about the meaning of disputed claim language. *Phillips*, 415 F.3d at 1314. Next, the specification is "the single best guide to the meaning of a disputed term" and is usually dispositive. *Id.* at 1315. The prosecution history may also explain the meaning of claim language and reveal "how the inventor understood the invention and whether the inventor limited the invention in the course of prosecution, making the claim scope narrower than it would otherwise be." *Phillips*, 415 F.3d at 1317. Courts are also authorized to consider extrinsic evidence, including "expert and inventor testimony, dictionaries, and learned treatises." *Id*. Expert testimony can be of assistance if, with respect to the disputed

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[1] In USITC Inv. No. 1373, the parties agreed that a POSITA for the '859 and '556 patents would have had "at least a bachelor's degree in electrical Engineering, computer science, computer engineering, or a related field, and approximately three years of experience in design, development, and/or testing of relevant multimedia processing, such as video, and/or image processing or coding. Advanced graduate studies with coursework and/or research focusing on topics of video encoding and decoding could substitute for working experience in the field."

claim language, it identifies what the "particular meaning in the pertinent field" would be to one skilled in the art. *Phillips*, 415 F.3d at 1318.

Means-Plus Function Limitations. A patent may describe a claim element in "means-plus-function" format, meaning the claim describes what the element does (its function) rather than how it is made (its structure). *See* 35 U.S.C. § 112 ¶ 6. "Construing a means-plus-function claim term is a two-step process." *Williamson v. Citrix Online, LLC*, 792 F.3d 1339, 1351-52 (Fed. Cir. 2015). "The court must first identify the claimed function." *Id.* "Then, the court must determine what structure, if any, disclosed in the specification corresponds to the claimed function." *Id.* If the patentee fails to disclose adequate corresponding structure, the claim is invalid as indefinite under 35 U.S.C. § 112. *Id.* "Structure disclosed in the specification qualifies as 'corresponding structure' if the intrinsic evidence clearly links or associates that structure to the function recited in the claim." *Id.* "Even if the specification discloses corresponding structure, the disclosure must be of 'adequate' corresponding structure to achieve the claimed function." *Id.* To be adequate, "the specification must contain sufficient descriptive text by which a person of skill in the field of the invention would know and understand what structure corresponds to the means limitation." *Function Media, L.L.C. v. Google, Inc.*, 708 F.3d 1310, 1317 (Fed. Cir. 2013).

Limiting Preamble. A preamble is limiting if: (1) it supplies antecedent basis for terms in a claim body; (2) there is clear reliance on the preamble during prosecution; or (3) it is "necessary to give life, meaning, and vitality" to the claims. *Catalina Mktg. Int'l, Inc. v. Coolsavings.com, Inc.*, 289 F.3d 801, 808 (Fed. Cir. 2002); *see also Bicon, Inc. v. Straumann Co.*, 441 F.3d 945, 952 (Fed. Cir. 2006). "The determination of whether preamble recitations are structural limitations or mere statements of purpose or use 'can be resolved only on review of the entirety of the patent to gain an understanding of what the inventors actually invented and intended to encompass by the

claim.' [] The inquiry involves examination of the entire patent record to determine what invention the patentee intended to define and protect." *Rowe v. Dror*, 112 F.3d 473, 478 (Fed. Cir. 1997).

III. OVERVIEW OF THE '859 PATENT

Entropy Encoding Background. The '859 patent relates to a video compression encoding and decoding technique called "entropy coding." When a video is encoded, it is first transformed into "symbols" that represent the video signal. An entropy encoder then converts the symbols into binary codes that take up less space. '859 Patent at 1:23-33. These binary codes make up a compressed bitstream, which is more efficient to store and transmit than the symbols. To convert symbols into binary codes, the entropy coder needs to predict how often each symbol is likely to appear in the relevant data. *Id.* The '859 patent calls this collection of probabilities a "probability model." *Id.* at 4:39-43. Using the probability model, the entropy encoder can assign smaller binary codes (e.g., '0' or '1') to symbols that are likely to appear more often and larger binary codes (e.g., '10110110' or '10110111') to symbols that are likely to appear less often. *Id.* That way, the symbols likely to appear frequently can be converted to the smallest binary codes, which provides compression. The efficiency of the encoder (i.e., how much compression it achieves) depends on how well its "probability model" matches the *actual* rate each symbol appears in the data. *See* '859 Patent at 2:29-34.

Admitted Entropy Coding Prior Art. The '859 patent does not claim to have invented entropy coding. *Id.* at 1:23-25. Rather, the patent discusses two prior art examples of entropy coding, one of which is referred to as Arithmetic Coding. Arithmetic Coding uses probabilities that are "updated regularly during the image coding of the image slice in order to take into account the characteristics of the source signal that is being coded." *Id.* at 1:51-54. That is, the probability model is updated as encoding proceeds and the encoder learns more about how often each symbol appears in the source signal. One drawback of Arithmetic Coding, however, is a "delay time" before the estimated probability of each symbol gets "closer to the real probability" of the source signal as shown in Figure 2 (above) of the patent. *Id.* at 2:4-11.

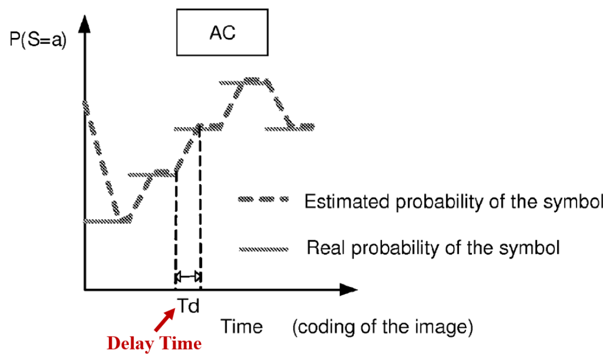


FIGURE 2 – PRIOR ART

Alleged Invention of the '859 Patent. The '859 patent claims to improve prior art entropy coding techniques like Arithmetic Coding by introducing "switching points" into the stream during the encoding process. *Id.* at 2:23-33. At these "switching points," the encoder can select a probability model, from a set of options, that is likely to be the best match for the source signal. *Id.* From there, the encoder also updates the probability model over time (as with the prior art Arithmetic Coding) as encoding proceeds and the encoder learns additional information about the symbol rate. *Id.* The patent shows this switching (and the alleged benefit) in Figure 9 (right). *See also id.* at 9:46-49. As shown, the estimated probability for any given symbol (shown with a dashed

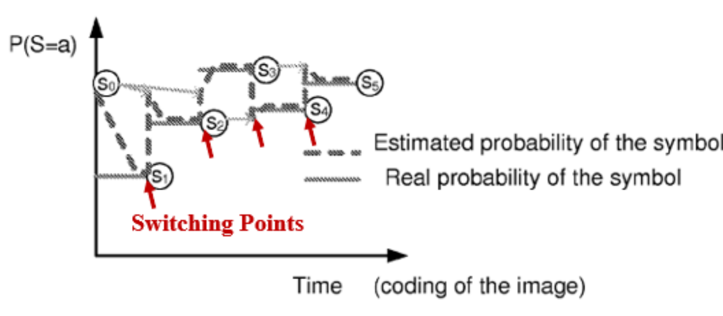


FIGURE 9

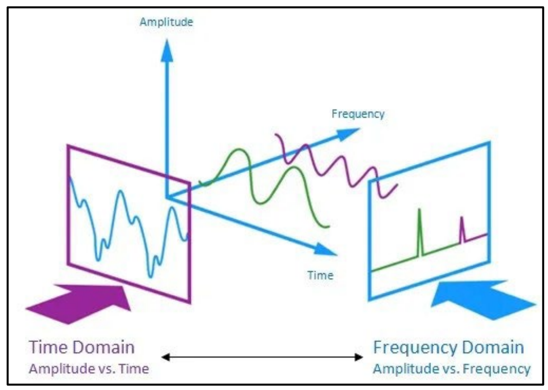
line) is changed at switching points when a different probability model is selected. From that new point, the probability model is updated over time as encoding proceeds. The ’859 patent claims that this allows for each symbol’s estimated probability to more closely match its real probability over time, when compared to the prior art Arithmetic Coding method. *Id.* at 9:53-54.

IV. OVERVIEW OF THE ’556 PATENT

Image Filtering Background. The ’556 patent relates to filters applied during the video encoding and decoding process, specifically focused on reducing visual defects known as “artifacts” or “quantization artifacts.” ’556 Patent at 4:58-67. Artifacts result from a process called “quantization,” which is a key step in the video compression process. *Id.* at 1:12-14. There are several types of quantization artifacts, including block artifacts, ringing artifacts, and “independent and identically distributed (i.i.d.) noise.” *Id.* at 1:14-17, 2:25-30. The ’556 patent discloses filters to address these artifacts. One type of relevant filter is a deblocking filter, which helps smooth the edges around a decoded block of image data. While known deblocking filtering methods are effective at reducing blocky artifacts, the ’556 patent says they are not effective at correcting other artifacts. *Id.* at 1:58-61. Another type of relevant filter is a “sparse de-noising filter.” A sparse de-noising filter addresses image noise called “independent and identically distributed (i.i.d.) noise.” *Id.* at 2:22-30. The “sparse de-noising filter” is a filter “which exploits a sparse image model using an over complete set of linear transforms and hard-thresholding.” *Id.* at 2:08-10. The ’556 patent proposes to apply both filters in succession—deblocking and then sparse de-noising—because “the quantization noise in video compression, and particularly with respect to the MPEG-4 AVC Standard, is usually *not* independent and identically distributed (i.i.d.)” before a deblocking filter is applied. *Id.* at 14:21-24. Relevant here, in *addition* to deblocking and sparse de-noising filters, the ’556 patent also lists deringing filters as a type of filter that targets quantization artifacts. *Id.* at 10:13-16. Deringing filters are designed to filter ringing artifacts, which are “[r]ipple-like

artifacts around sharp edges in a decoded image." Ex. A, (Richardson, The H.264 Advanced Video Compression Standard) at xix. The '556 patent does not claim deringing filters.

Sparse De-noising Filters. A "sparse de-noising filter" as a filter "which exploits a sparse image model using an over complete set of linear transforms and hard-thresholding." *Id.* at 2:08-10. The "approach basically includes three steps: *transform*; transform coefficients *threshold*, and *inverse transform*." '556 Patent, at 2:14-16; *see also* Fig. 5. That is, the image begins in the "pixel domain." Ex. B, (Orchard Decl.) at ¶ 63. A transform is applied to the image, and the image is transformed into a different representation referred to as a "transform domain" which allow for noise to be more easily filtered. *Id.* at ¶ 63. Then, within the transform domain, all values in the representation below a certain threshold value (which represent noise) are removed, while values above the threshold value (which represent the true signal) are kept. *Id.* at ¶ 65. Finally, the image is converted back to the pixel domain by applying an inverse transform. *Id.* at ¶ 66. An example of a transformation is reflected in the image to the right and shows that the same signal in multiple representations.



Alleged Invention of the '556 Patent. The '556 patent does not claim to have invented filtering techniques like deblocking filters or sparse de-noising filters. The patent concedes that these filters were known in the art. '556 Patent at 1:33-38, 2:04-10. The claimed novelty of the '556 patent lies in the application and combination of these existing filters; specifically, the sequential use of these filters. A deblocking filter is employed first to reduce blocky artifacts and a sparse de-noising filter follows to further reduce quantization noise. *Id.* at 14:24-36.

V. ’859 PATENT

A. “arithmetic decoding method for symbols coded in the form of a stream, comprising the following steps applied at switching points distributed in said stream to decode a current symbol” (claim 10)

IDC Construction	Lenovo Construction
The terms “stream” and “current symbol” are limiting at least to the extent that they provide antecedent basis for those terms as they appear elsewhere in the claim. stream: stream of data. switching point: a point in the stream at the level of which the probability model used to code the current symbol can be modified. current symbol: a symbol that is currently being decoded.	The portion of this claim term following “comprising” is not part of the preamble and therefore is limiting. Regardless, the entire term is limiting. The preamble is limiting. To the extent construction is necessary, stream: “stream of data” current symbol: “a symbol that is currently being decoded” switching point: “a point in the stream at the level of which the probability model used to code the current symbol can be modified—i.e., a probability model can be selected”

There are three disputes for this term: (1) the identification of the preamble of claim 10; (2) whether the preamble is limiting; and (3) how “switching points” should be construed.

1. The Preamble of Claim 10 is the Language Before “Comprising”

The parties dispute what is the preamble of claim 10. The Federal Circuit has repeatedly found that transition terms such as “comprising” divide the preamble from the claim body. *Bicon*, 441 F.3d at 949 (“[T]he preamble consist[s] of everything in the claim preceding the word ‘comprising,’ . . . .”). In fact, “comprising” is a commonly-used transition term. *In re Fought*, 941 F.3d 1175, 1178 (Fed. Cir. 2019). Here, the preamble is the phrase “arithmetic decoding method . . . of a stream,” because it precedes the transition term “comprising” in claim 10. The phrase after the transition “comprising,” therefore, is claim body.

2. The Preamble of Claim 10 is Limiting

Even if the entire phrase is considered the preamble, it is limiting because it bears two hallmarks of a limiting preamble: it supplies the antecedent basis for the term "stream" and it gives life, meaning, and vitality to the claim by encapsulating the heart of the purported invention. ***First***, the phrase supplies antecedent basis for terms in the body of the claim. *See Catalina*, 289 F.3d at 808. When the antecedents are "intertwined with the rest of the preamble," the entire preamble is considered limiting. *Bio-Rad Labs., Inc. v. 10X Genomics Inc.*, 967 F.3d 1353, 1371 (Fed. Cir. 2020). As shown below, the phrase supplies the antecedent basis for "**said stream**" and "**the stream**," which appear in the claim body:

> 10. *Arithmetic decoding method for symbols coded in the form of* ***a stream***, comprising the following steps applied at switching points distributed in **said stream** to decode a current symbol:
>
> decoding from **the stream**, for said current symbol, a probability model identifier…

'859 Patent at claim 10. Further, the term "stream" is intertwined with the rest of the phrase "symbols coded in the form of a stream," because the phrase "symbols coded in the form of" modifies "a stream." Thus, the preamble supplies an antecedent basis for a term in the claim body, and therefore, should be construed as limiting. Further, if the Court holds that the preamble is the full phrase, the limiting effect of the preamble is further confirmed because it provides antecedent basis for two additional terms: "said current symbol," and "the current symbol."

Second, the phrase also "'give[s] life, meaning, and vitality' to the claim." *Catalina Mktg.*, 289 F.3d at 808. A preamble gives life, meaning, and vitality to the claim if, upon review of the entire patent, it reflects "what the inventors actually invented and intended to encompass by the claim. *Id.* Here, the phrase explains that the remaining claimed method steps are "applied at switching points" distributed in the stream to decode a current symbol. Performing these steps, at a switching point, is what the inventors purportedly invented. As discussed above and in the

declaration of Dr. Orchard, what the '859 patent inventors allegedly invented was the concept of distributing "switching points" in the stream, so an encoder or decoder can "switch" to a probability model that is likely to be a better match for the source signal at that point in the stream. *See* '859 Patent at 2:23-33; Ex. B, (Orchard Decl.) at ¶¶ 38-46. According to the '859 patent, adding switching points into the stream where a probability model may be selected improved the prior art approach of updating the same probability model over time, because the prior art method was too slow to adapt to changes in the stream of data. '859 Patent at 2:7-11; 2:23-33. During prosecution of a related European patent application, the European Patent Office ("EPO") confirmed that updating the probability model at "switching points" is the heart of the alleged invention: "The *invention* is defined so as to *switch the coding model* (which forms the basis for the data compression, for example the VLC data compression, like Huffman or arithmetic coding) *at so-called 'switching points'*." Ex. C, EP2449683 File History at 473.[2] Thus, if the Court holds the preamble is the entire phrase, the preamble captures the invention, and must be limiting.

3. The Construction of "Switching Points"

Although the parties agree the specification describes the meaning of switching points at column 4, lines 57-60, the parties disagree on the meaning of that description. Particularly, the parties disagree whether "switching points" are locations where a different probability model can be *selected* or merely be *updated*. Because the interpretation that allows the probability model to be merely updated would nullify the purported inventive contribution, the correct interpretation requires "switching points" to be locations in the stream where a probability model may be *selected.*

[2] This application has the same specification as the '859 patent. Ex. C, EP2449683 at 436-465.

The specification shows the alleged improvement was adding "switching points" to the stream so that the encoder/decoder could *select* a probability model that best matches the source signal at that point in time. *See* Ex. B, (Orchard Decl.) at ¶¶ 77-94. This is shown by comparing the prior art method (called Arithmetic Coding) and the purported improvement. *Compare* '859 Patent at Fig. 2 *with* Fig. 9. *Both* Arithmetic Coding and the purported invention use the same steps of **coding a current symbol** and **updating the current probability model**. The purported invention goes one step farther by adding "**switching points**" into the stream so the encoder/decoder can **select** a probability model that better matches the source signal:

Arithmetic Coding	**Purported '859 Patent Invention**
"AC entropy coding comprises principally the following steps to code a current symbol Sc: coding of the current symbol Sc according to a current probability model Pc, and updating the current probability model Pc according to the coding of the current symbol Sc." *Id.* at 4:33-38 (emphasis added).	"**The invention** relates to an arithmetic method for coding symbols in a stream, comprising the following steps: coding a current symbol according to a current probability model, and updating the current probability model according to the coding of the current symbol. The method also comprises, *in the* ***switching points*** *distributed in the stream*, the following steps: **selecting** the current probability model in a set of at least two probability models according to a coding cost criterion, and coding an identifier of a selected probability model. Advantageously the arithmetic coding method according to **the invention** *enables the real probability to be approached more rapidly than with a standard VLC or AC type method* and thus enables the symbol or symbols to be coded more efficiently, i.e. at a lower coding cost." *Id.* at 2:17-33 (emphasis added).

As shown in the description of the purported invention above, after first describing that the method **codes** a symbol and **updates** the probability model (just like Arithmetic Coding,) the purported invention "also" includes the additional step of **selecting** a probability model at "**switching points** distributed in the stream." *Id.* at 2:23-33. This step "enables the real probability

to be approached more rapidly than with" the prior art Arithmetic Coding method. *Id.*; *see also* Ex. B, (Orchard Decl.) at ¶¶ 80-81.

The '859 patent's figures reinforce the same distinction between updating and selecting a probability model using "switching points." As an example, Figure 11 shows a series of decoding steps that correspond to asserted claims 10 and 15. '859 Patent at Fig. 11 (annotated). The decoder first determines "if the location is on a switching point" (step 200). '859 patent at 10:64-65. If the current symbol is *not located at a switching point* (the path highlighted in gray), it decodes the current symbol (step 206) and updates the current probability model (step 208)—just as in the prior art. *Id.* at 11:55-59; *id.* at 5:44-46 (describing that in Figure 3 "the current probability model Pc is updated according to the method described previously in reference to the [Arithmetic] coding."). On the other hand, if the current symbol *is located at a switching point* (the path highlighted in yellow), the decoder performs a series of steps to *select* a probability model for use going forward (steps 202, 204, and 205) before it then decodes the current symbol and updates the probability model using the steps known in the prior art (steps 206 and 208). *Id.* at 11:12-59. The salient difference in the two paths is clear: when the current symbol is at a "switching point," the decoder *selects* a probability model to use and then—for both paths—the probability model is *updated.*

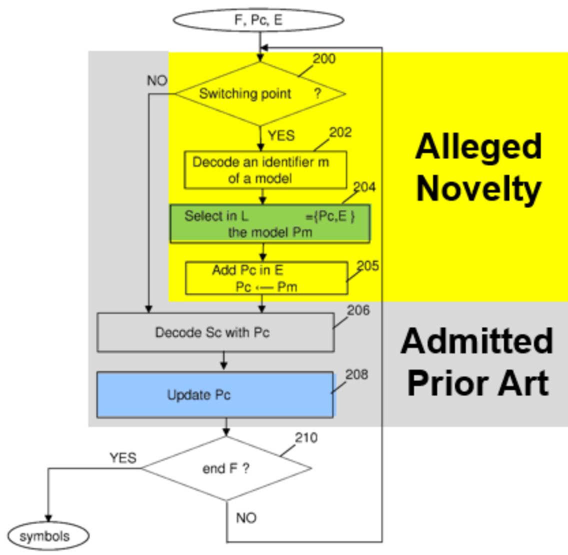


FIGURE 11

Although IDC takes a different position now, it admitted that "switching points" are the points in the stream when the decoder selects a different probability model when prosecuting related patents. Responding to a rejection that the specification does not disclose where

specifically the "switching points" should be located to achieve the invention's alleged benefits, IDC identified the same specification language at issue here. Ex. C, at 626 (emphases added). IDC explained that "switching points" are locations where the probability model can be modified "according to *selection* criterion"—i.e., where a probability model can be selected. *Id.* IDC reiterated this description in another filing, confirming that "switching point" refers to a candidate point for "switching" the probability model and is what provides the alleged improvement over prior art: "In other words, *a switching point is a candidate point for switching the [probability model]* of a given symbol in the arithmetic coding/decoding." *Id.* at 850 (emphasis added). And later in prosecution, IDC again explained that switching points are located "where such new *selection* of probability models is to happen either in the encoding or decoding method." *Id.* at 852 (emphasis added).

During prosecution, IDC also distinguished prior art on the same basis. The EPO rejected claims over a prior art technique for arithmetic coding. IDC responded that the prior art technique disclosed a probability model that is "continuously updated" during the encoding/decoding process. *Id.* at 855. IDC then claimed the prior art technique's continuously *updating* the probability model did not suggest "a possible *switching* of probability models at switching point in the stream." *Id.* IDC explained that merely updating a probability model was not its invention, because updating occurs "not only at switching points but continuously with the coding of symbols." *Id.* at 856.

B. "means for" terms of claim 15

Claim 15 of the '859 patent recites five "means for" limitations. The parties agree these limitations are means-plus-function terms subject to 35 U.S.C. § 112 ¶ 6. The only disputed issues are the precise formulation of certain functions and whether the specification discloses sufficient structure for those claimed function, which is necessary to render the claim definite. It does not.

Because IDC alleges the same specification excerpts identify the corresponding structures, the arguments are substantially related.

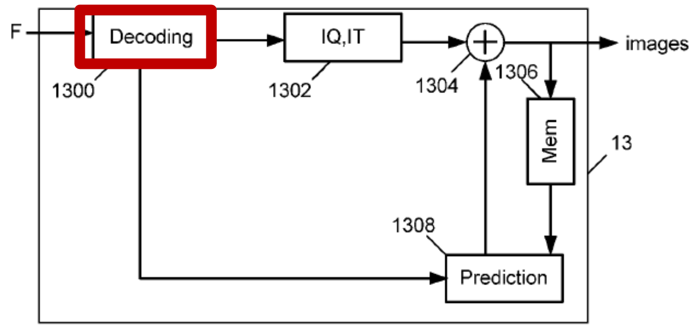
1. "means for decoding from the stream, at switching points distributed in said stream to decode a current symbol, for said current symbol, a probability model identifier" (claim 15)

IDC Construction	Lenovo Construction
Function: decoding from the stream . . . a probability model identifier Structure: an arithmetic decoder and equivalents thereof. *See* FIG. 13 and 13:25-52. Alternatively, the structure is an arithmetic decoder operable to perform the claimed function, as described in the specification in connection with step 202 and equivalents thereof, step 202 being described in the specification, for example at the following figures and passages: FIG. 13 and 13:25-52 and FIGS. 10, 11 and 10:1-14, 11:12-34.	Function: decoding a probability model identifier for the current symbol from the stream, at switching points distributed in the stream Structure: indefinite for lack of sufficient corresponding structure.

Function. IDC truncates the claimed function by omitting the additional requirements that the step is performed "for the current symbol" and "at switching points distributed in the stream." These limitations provide details about the step that are part of the claimed function. These additional limitations must be identified as such in the means-plus-function analysis. *See, e.g.*, *Bennett Marine, Inc. v. Lenco Marine, Inc.*, 549 Fed. Appx. 947, 954 (Fed. Cir. 2013) (finding the "district court erred by failing to fully identify the function" because the claim recited that the "means" must "automatically mov[e]" the trim tabs "upon removal of power at said engine").

Structure. Regardless of the adopted function, the specification fails to disclose sufficient structure. Although the specification discusses "decoding" a probability model identifier from the stream, it does so by describing the function and not by describing any particular structure for performing it. *See* '859 Patent at Figs. 10 & 11, 10:1-14, 11:12-34.

Neither of IDC's two "alternative" disclosures of structure are sufficient. ***First***, for "an arithmetic decoder and equivalents thereof. *See* FIG. 13 and 13:25-52," these parts of the specification do not recite sufficient corresponding structure. Ex. B, (Orchard Decl.) at ¶¶ 101-09. For Figure 13, the outermost box is a "decoding device" (labeled 13) with components (labeled 1300, 1302, 1304, 1306, and 1308).



'859 Patent at Fig. 13 (above); *id.* at 4:27-28. Figure 13 provides no insight about the structure(s) corresponding to the "decoding" function.

Instead, the '859 patent states in generic fashion that the "decoding" function is performed within the "**entropy decoding module**" labeled 1300 in Figure 13, above. *Id.* at 13:32-35. In fact, the patent explains that ***all of*** the functions recited in claim 15 are all performed within **entropy decoding module** 1300. The '859 patent states that the steps shown in Figure 11—decoding a probability model identifier (step 202), selecting a probability model using the identifier (step 204), adding a probability model into the subset of probability models (step 205), decoding the current symbol with the current probability model (step 206), and updating the current probability model (step 208)-are all performed within the **entropy decoding module** 1300 shown in Figure 13. *Id.* at 13:32-35 ("[T]he entropy decoding module 1300 implements the steps 200, 202, 204, 206, 208, 210 and possibly 205 of the arithmetic decoding method according to the invention.").

Thus, the "decoding device" 13 shown in Figure 13 is not where the claimed functions are performed; rather the specification explains the claimed functions are performed within "entropy decoding module" 1300. But "entropy decoding module" 1300 also fails to show sufficient structure to perform each and every one of these functions. Figure 13 says nothing about the

structure of entropy decoding module 1300; it is a complete black box labeled "decoding," which just impermissibly restates the claimed function itself. *See Noah Sys., Inc. v. Intuit Inc.*, 675 F.3d 1302, 1316-17 (Fed. Cir. 2012) ("This type of purely functional language, which simply restates the function associated with the means-plus-function limitation, is insufficient to provide the required corresponding structure.").

Nor do the words "entropy decoding module" themselves inform a POSITA what specific structures correspond to the claimed functions. "Module" is a "well-known nonce word" that does not disclose any structure, just like "means." *Williamson*, 792 F.3d at 1350. And the words "entropy decoding" also do not connote any definite structure either. A POSITA would understand that entropy decoding can be implemented in any number of different structures including a microprocessor, discrete logic, an application specific integrated circuit (ASIC), a field programmable gate array (FPGA), a digital signal processor (DSP), a system on a chip (SoC), or discrete logic, software, hardware, firmware or any combinations thereof. Ex. B, (Orchard Decl.) at ¶¶ 104-06. Dr. Orchard identified half a dozen different examples of options to implement a decider known to a POSITA. *Id.* at ¶ 105.

The '859 patent itself admits the same: there is no particular, physical structure that a POSITA would recognize as corresponding to the claimed functions. The claimed functions are "are not linked to a coding standard," '859 patent at 13:67-14:2, and they could be implemented in any number of physical forms, including "in a single component," as "functions of the same software," or as "separate physical entities," *id.* at 13:53-61. Under these circumstances, the mere reference to "entropy decoding" does not disclose sufficient structure.

The Federal Circuit's decision in *Ergo Licensing, LLC v. CareFusion 303, Inc.*, 673 F.3d 1361 (Fed. Cir. 2012), is instructive. There, the court held the specification's description of a

"control device" insufficient to provide structural support for the claimed "control means" because "there were *at* least three different types of control devices commonly available and used at the time to control adjusting means: microprocessors, discrete circuits connected to stepper motors, and analog circuits." *Id.* at 1364. The court explained that "[a]lthough one of skill in the art may have been able to find a structure that would work, that does not satisfy § 112 ¶ 6. Under § 112 ¶ 6, a patentee is only entitled to 'corresponding structure . . . *described in the specification* and equivalents thereof,' not any device capable of performing the function." *Id.* Thus, as set forth in *Ergo*, the relevant question here is not whether a POSITA "may have been able to find a structure that would work." *Ergo*, 673 F.3d at 1364. The question is whether the *specification itself* discloses a structure that a POSITA would be able to recognize and associate with the function in the claim. *Id.* It does not.

Finally, the specification passage that IDC cites (13:25-52) describes decoding in functional terms. The passage states that the entropy decoding module is "able to generate decoded data, for example coding modes and decoded data relating to the content of the images." But as explained above, simply restating the *function* of the entropy decoding module, i.e., decoding, does not inform a POSITA what *structures* correspond to the claimed function. *Finisar Corp. v. DirecTV Group, Inc.*, 523 F.3d 1323, 1340 (Fed. Cir. 2008).

Second, the alternative IDC identifies also do not disclose sufficient structure. Ex. B, (Orchard Decl.) at ¶¶ 109-12. The "step 202" that IDC identifies is another black box that restates the *function* of "decoding" a probability model identifier. Indeed, the '859 patent readily admits that step 202 shows a "functional unit." *Id.* at 13:53-55. Restating the claimed function does not render the claim definite, as a matter of law. *See Noah Sys.*, 675 F.3d at 1316-17. Nor do the passages IDC cite (10:1-14 and 11:12-34) disclose any structure. Both passages merely state that

during step 202, "an identifier m is decoded from the stream" and that the "identifier enables identification of a probability model in a set L of at least two probability models." '859 Patent at 10:1-14, 11:12-34. The remainder of the passages discuss what is included in the set of probability models. *See id.* Here again, this mere restatement of the claimed *function* ("decoding" a probability model identifier) does not inform a POSITA of corresponding *structures* used for decoding and does not render the claim definite.

2. "means for selecting using said probability model identifier a probability model in a set comprising a current probability model defined from symbols coded previous to the current symbol and a subset of probability models wherein subset comprises at least one probability model defined by default" (claim 15)

IDC Construction	Lenovo Construction
Function: selecting . . . a probability model Structure: an arithmetic decoder and equivalents thereof. *See* FIG. 13 and 13:25-52. Alternatively, the structure is an arithmetic decoder operable to perform the claimed function, as described in the specification in connection with step 204 and equivalents thereof, step 204 being described in the specification, for example at the following figures and passages: FIG. 13 and 13:25-52 and FIGS. 10, 11 and 5:36-43, 10:1-17, 11:12-36.	Function: using the probability model identifier to select a probability model in a set comprising a current probability model defined from symbols coded previous to the current symbol and a subset of probability models wherein said subset comprises at least one probability model defined by default Structure: indefinite for lack of sufficient corresponding structure.

Function. IDC again truncates the claimed function by shortening it to "selecting a probability model," but the claim language recites the additional requirements that the action of selecting a probability model is performed "using said probability model identifier" and that the selection is further to select a probability model "in a set comprising a current probability model defined from symbols coded previous to the current symbol and a subset of probability models wherein subset comprises at least one probability model defined by default." For the same reasons described above, these additional details about the action taken are part of the claimed function

and should be identified as such in the means-plus-function analysis. *See Bennett Marine*, 549 Fed. Appx. at 954 (Fed. Cir. 2013) (finding the "district court erred by failing to fully identify the function" because the claim recited that the "means" must "automatically mov[e]" the trim tabs "upon removal of power at said engine").

Structure. The specification fails to recite sufficient structure regardless of which party's proposed function is adopted. The specification fails to disclose sufficient structure for performing the more general function of "selecting a probability model" that IDC propose, much less for performing the more specific functions reflected in Lenovo's proposals. Although the specification discusses "selecting" a probability model, it does so by describing the function and not by describing any particular structure for performing it. *See* '859 Patent at Figs. 10, 11, and 10:1-17, 11:12-36.

Neither of IDC's two "alternative" disclosures of structure are sufficient. ***First***, for "an arithmetic decoder and equivalents thereof. *See* FIG. 13 and 13:25-52," which is the same structure IDC identified for the "means for decoding . . . a probability model identifier" term above. For the reasons discussed above, those portions of the '859 patent do not recite sufficient corresponding structure, rather the specification's description of the "selecting" step is entirely functional, occurs within a black box called an "entropy decoding module" 1300, and does not sufficiently inform a POSITA of any corresponding structure for the same reasons discussed above. *See* Section V.B.1; Ex. B, (Orchard Decl.) at ¶ 116.

Second, the alternative IDC identifies does not disclose sufficient structure. The "step 204" that IDC identifies is simply a black box that restates the *function* of "selecting" a probability model. The '859 patent admits that step 204 shows a "functional unit." '859 Patent at 13:53-55. Nor do the passages IDC cite (10:1-17 and 11:12-36) disclose any structure. Both passages merely

restate the *function* that during step 204, "the probability model of L for which the identifier is m is selected." *Id.* at 10:1-17 and 11:12-36. Finally, IDC cites one additional passage for this term (5:36-43), but that passage is also unavailing. Like the two other passages addressed above, it describes a *function*—namely, the function that during step 104 of Figure 3, "an identifier m of the model selected in the set L is coded in the stream." *Id.* at 5:36-37. In addition, that passage is irrelevant to the function actually at issue for this term, which relates to *selecting* a probability model using a probability model identifier. The passage at 5:36-43 instead describes the function of *coding* an identifier into the stream for the selected probability model. *Id.*

3. "means for adding in said subset said current probability model, the selected probability model becoming the current probability model" (claim 15)

IDC Construction	Lenovo Construction
Function: adding in said subset said current probability model Structure: an arithmetic decoder and equivalents thereof. See FIG. 13 and 13:25-52. Alternatively, the structure is an arithmetic decoder operable to perform the claimed function, as described in the specification in connection with step 205 and equivalents thereof, step 205 being described in the specification, for example at the following figures and passages: FIG. 13 and 13:25-52 and FIGS. 8, 10, 11 and 11:37-43 (describing 205 and additionally that step 205 can be identical to step 105), FIG. 7 and 8:8-37 (describing step 105).	Function: adding the current probability model into the subset of probability models Structure: indefinite for lack of sufficient corresponding structure.

Structure. The specification again fails to recite sufficient structure regardless of which party's proposed function is adopted (although both functions are similar in substance). The specification fails to disclose sufficient structure for the more general function of "selecting a probability model" that IDC proposes, or the more specific functions reflected in Lenovo's proposal. Although the patent discusses "adding" the probability model into the subset of models, it does so only in impermissible functional terms. *See* '859 Patent at Fig. 11, 11:37-43.

Neither of IDC's two "alternative" disclosures of structure are sufficient. ***First***, IDC identifies the same structure IDC identified for the "means for decoding . . . a probability model identifier" term above. For the reasons above, those portions of the '859 patent do not recite sufficient corresponding structure, rather the specification's description of the "adding" step is entirely functional, occurs within a black box called an "entropy decoding module" 1300, and does not sufficiently inform a POSITA of any corresponding structure for the same reasons discussed above. *See* Section V.B.1; Ex. B, (Orchard Decl.) at ¶ 125.

Second, the alternative IDC identifies does not disclose sufficient structure. The "step 205" that IDC identifies is simply a black box that restates the *function* of "adding" the current probability model. The '859 patent admits that step 205 shows a "functional unit." '859 Patent at 13:53-55. Nor does the cited passage at 11:37-43 disclose any structure. There, the specification again restates the *function* that during step 205, "the current probability model Pc is added to the subset E." *Id.* at 11:37-43. Although the specification states that this step is "further detailed" in Figure 8, that figure does not identify any corresponding structure, either. Figure 8 also describes the "adding" function using a generic, black box description as shown in step 1054.

Nor do the remaining disclosures (Figure 7 and 8:8-37) help IDC. Like Figures 8, 10, and 11, step 105 of Figure 7 restates the function of the "adding" the current probability model. Similarly, the specification at 8:8-37 describes the *function* that during step 105, "the current probability model Pc is added to the subset E." *Id.* at 8:9-10. The passage then continues by describing some alleged benefits of the "adding" function (e.g., that it makes the coding process "more efficient," *id.* at 8:14-17), but it does not describe any *structure* corresponding to the "adding" function that would render this term definite.

4. "means for decoding said current symbol with said current probability model" (claim 15)

IDC Construction	Lenovo Construction
Function: decoding said current symbol Structure: an arithmetic decoder and equivalents thereof. *See* FIG. 13 and 13:25-52. Alternatively, the structure is an arithmetic decoder operable to perform the claimed function, as described in the specification in connection with step 206 and equivalents thereof, step 206 being described in the specification, for example at the following figures and passages: FIG. 13 and 13:25-52 and FIGS. 10, 11 and 10:18-19, 11:55-57.	Function: decoding the current symbol with the current probability model Structure: indefinite for lack of sufficient corresponding structure.

Function. IDC again truncates the claimed function, but the claim language recites the additional requirements that the action of decoding the current symbol is performed "with the current probability model." For the same reasons described above, this additional detail about the action taken is part of the claimed function and should be identified as such in the means-plus-function analysis. *See Bennett Marine*, 549 Fed. Appx. at 954 (Fed. Cir. 2013).

Structure. The specification fails to recite sufficient structure under § 112 ¶ 6 under any formulation of the function. Although the specification discusses "decoding" current symbol, it does so by describing the function and not by describing any particular structure for performing it. *See* '859 Patent at Figs. 10 & 11, 10:18-19, 11:55-57.

Neither of IDC's two "alternative" disclosures of structure are sufficient. ***First***, IDC identifies the same corresponding structure as identified for the "means for decoding . . . a probability model identifier" term above. For the reasons discussed above, those portions of the '859 patent do not recite sufficient corresponding structure. The specification's description of the "decoding" step is entirely functional, occurs within a black box called an "entropy decoding

module" 1300, and does not sufficiently inform a POSITA of any corresponding structure for the same reasons discussed above. *See* Section V.B.1; Ex. B, (Orchard Decl.) at ¶ 134.

Second, the alternative IDC identifies does not disclose sufficient structure. The "step 206" that IDC identifies is a black box that restates the *function* of "decoding" a current symbol with the current probability model. The '859 patent admits that step 206 shows a "functional unit." '859 Patent at 13:53-55. Nor do the two new passages IDC cite (10:18-19 and 11:55-57) disclose any structure. Both passages merely restate the *function* that during step 206, "the current symbol Sc is decoded with the current probability model Pc." *Id.* at 10:18-19; 11:55-57.

5. "means for updating said current probability model according to the decoding of said current symbol" (claim 15)

IDC Construction	Lenovo Construction
Function: updating said current probability model Structure: an arithmetic decoder and equivalents thereof. *See* FIG. Figure 13 and 13:25-52. Alternatively, the structure is an arithmetic decoder operable to perform the claimed function, as described in the specification in connection with step 208 and equivalents thereof, step 208 being described in the specification, for example at the following figures and passages: FIG. 13 and 13:25-52 and FIGS. 10, 11, 4:33-54, 10:20-22, 11:57-61.	Function: updating the current probability model according to the decoding of the current symbol Structure: an algorithm wherein an occurrence number for the current symbol is increased by 1.

Lenovo does not assert that this term is indefinite under § 112 ¶ 6, but the parties dispute the proper identification of the claimed function and structure.

Function. IDC truncates the claimed function by shortening it to "updating said current probability model," but the claim language recites the additional requirements that the action of updating the current probability model is performed "according to the decoding of the current symbol." For the same reasons described above, this additional detail about the action taken is

part of the claimed function and should be identified as such in the means-plus-function analysis. *See Bennett Marine*, 549 Fed. Appx. at 954 (Fed. Cir. 2013).

Structure. The specification explains the corresponding structure is the following algorithm. *Noah Sys.*, 675 F.3d at 1312 (citing *Aristocrat Techs. Austl. Pty Ltd. v. Int'l Game Tech.*, 521 F.3d 1328, 1333 (Fed. Cir. 2008)). When describing the "updating" step, the specification states the current probability model is updated "according to the method described previously in reference to the AC coding." *Id.* at 11:57-59 (describing step 208 in Figure 11). This refers to the specification's prior description of Arithmetic Coding, which updates a probability model by increasing the occurrence number for the current symbol by 1. '859 patent at 4:42-45("If the symbol Sc takes the value 'b' then in the step of updating of the current probability model Pc, the associated probability is increased, i.e. the occurrence number F(Sc=b) is increased by 1."). Since this is the only arguable disclosure of an "algorithm" for updating a probability model according to the decoding of the current symbol (i.e., the claimed function), the corresponding structure for this term should be construed as "an algorithm wherein an occurrence number for the current symbol is increased by 1." *See* Ex. B, (Orchard Decl.) at ¶¶ 141-42.

Neither of IDC's two "alternative" disclosures of structure are sufficient. ***First***, IDC identifies the same structure IDC identified for the "means for decoding . . . a probability model identifier" term above. For the reasons discussed above, those portions of the '859 patent do not recite sufficient corresponding structure, rather the specification explains this step occurs within a black box called an "entropy decoding module" 1300 and does not sufficiently inform a POSITA of any corresponding structure for the same reasons discussed above. *See* Section V.B.1; Ex. B, (Orchard Decl.) at ¶ 144.

Second, the alternative IDC identifies does not disclose sufficient structure. The "step 208" that IDC identifies is simply a black box that restates the *function* of "decoding" a current symbol with the current probability model. The '859 patent admits that step 208 shows a "functional unit." '859 Patent at 13:53-55. The last two passages IDC cite (10:20-22, 11:57-61) also do not disclose any structure. Both passages merely restate the *function* that during step 208, "the current probability model Pc is updated according to the method described previously in reference to the AC coding." *Id.* at 10:20-22, 11:57-61. The first passage IDC cites (4:33-54) is the same one discussed above that supports Lenovo's construction, i.e., updating by increasing the occurrence number for the current symbol by 1. *Id.* at 4:42-45.

VI. '556 PATENT

A. "sparse de-noising filter"

IDC Construction	Lenovo Construction
Plain and ordinary meaning	sparse de-noising filter for performing a second pass to reduce noise, which is not a deringing filter Alternatively, a filter which exploits a sparse image model using an over complete set of linear transforms and hard thresh-holding, which is not a deringing filter

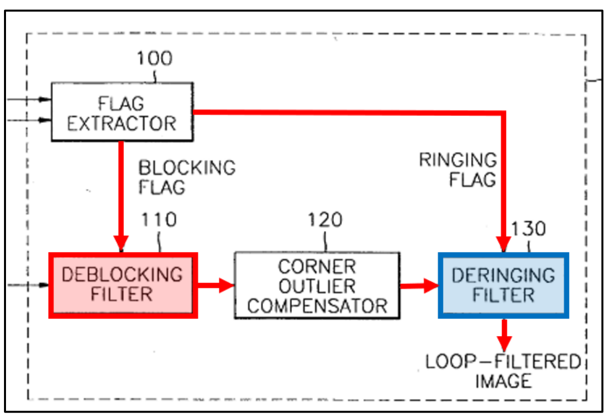
The parties have two disputes: (1) whether IDC have disclaimed "deringing filters" from the scope of the '556 patent, and (2) the construction of a "sparse de-noising filter."

1. IDC Disclaimed "Deringing Filters" During Prosecution

During the prosecution of U.S. Patent 9,277,243 ("the '556 Parent Patent"), from which the '556 patent continues, IDC disclaimed "deringing filters" from the scope of the claims. This disclaimer applies to the '556 patent because the prosecution history of a limitation in a parent patent applies to the same limitation in subsequent, related patents. *Trading Techs. Int'l v. Open E Cry*, LLC, 728 F.3d 1309, 1323 (Fed. Cir. 2013). Both the '556 Parent Patent and the '556

patent itself have the same limitation: "adaptive sparse de-noising filter for performing a second pass to reduce noise." Ex. D, '556 Parent Patent, at claim 1, *with* '556 Patent at claim 1.

The context of prosecution history for this limitation is relevant. Before issuance, claim 1 of the '556 Parent Patent application required "two filters" for filtering "a first and a second type of quantization artifact" without further specificity on the types of required filters or the types of artifacts to be filtered (i.e., did not specify a sparse de-noising filter). Ex. E, ('556 Parent Patent File History) at 2971. The PTO rejected the claim as written for being anticipated by U.S. Patent Application No. 2003/0219073 ("Lee") (Ex. F) because Lee discloses an "encoder having *at least two filters* . . . ." Ex. E, ('556 Parent Patent File History) at 3041 (emphasis added). More particularly, Lee disclosed a deblocking filter and deringing filter as shown in Lee's Figure 1 below. Ex. F (Lee) at ¶ 31 ("[T]he apparatus comprising: . . . a *deblocking filter* for deblocking filtering the image data . . . and a *deringing filter* for deringing-filtering . . . .").



Id., at Fig. 1 (annotated with the deblocking filter in **red** and deringing filter in **blue**)

In response, the applicant amended the pending claim to require two specific filters: "a deblocking filter for performing a first pass to reduce blocking artifacts and *a sparse de-noising filter for performing a second pass* to reduce noise." Ex. E, ('556 Parent Patent File History) at 3064. As a result, the claim was narrowed to cover not just any two filters, but specifically a deblocking filter and "sparse de-noising filter." The applicant argued the amended claim overcame

the Lee rejection and clearly and unequivocally distinguished Lee's deringing filters from sparse de-noising filters (as claimed): "The cited portions of Lee *do not* expressly or inherently disclose at least *a sparse de-noising filter for performing a second pass* to reduce noise. While the cited portions of Lee may disclose deringing filtering, *Lee does not disclose* or suggest *a sparse de-noising filter for performing a second pass* to reduce noise." Ex. E, at 3071.

The applicant repeated its disclaimer of deringing filters throughout the lineage of the patent family, for example in U.S. Patent No. 11,089,337 ("the '337 patent"), which is a continuation of the '556 patent. In response to another obviousness rejection over Lee, the applicant again distinguished Lee's deringing filters, stating that "Lee discloses a ringing de-noising filter and does not disclose a sparse denoising filter." Ex. G, ('337 File History) at 2321; *id*. at 2267. Both the applicant and the examiner made this distinction repeatedly throughout the prosecution history. *See, e.g.*, *id.* at 2332, 2361.

The applicant's disclaimer of deringing filters also extends to its foreign counterparts. As background, the '556 patent flows from an international patent application PCT/US2007022795 ("the PCT '795 application"). During the European prosecution of the PCT '795 application, which was assigned European Patent Application No. 07970824.5 ("the EP '824 application"), the applicant made precisely the same amendment to overcome principally the same rejection—the claim began with two generic filters, triggered an objection from the examiner, and the applicant amended the independent claim to "further specify the type of filters." Ex. H, (EP '824 App. File History) at 3479; *id.* at 3493, 3536. The applicant noted that "none of the cited references teaches having two in-loop filters the first one being a deblocking filter *and the second one being a sparse filter*." *Id.* at 3536 (emphasis added). Like its U.S. counterparts, the applicant distinguished the

invention's use of sparse denoising filters from deringing filters, which again were pervasive in the prior art.

Because the applicant's disavowals were "clear and unmistakable" to a POSITA, the meaning of sparse de-noising filter cannot include a deringing filter. *Omega Eng'g, Inc. v. Raytek Corp.*, 334 F.3d 1314, 1326 (Fed. Cir. 2003). Prosecution disclaimer "promotes the public notice function of the intrinsic evidence and protects the public's reliance on definitive statements made during prosecution." *Id*. at 1324. IDC's attempt at recapturing this disclaimed claim scope undermines the public notice function.

2. Alternatively, Sparse De-noising Filter Should Be Construed According to the Specification

If construction of this term beyond the disclaimer is necessary, the construction should reflect the inventor's definition: a filter "which exploits a sparse image model using an over complete set of linear transforms and hard thresh-holding." '556 Patent at 2:8-10. Lenovo's proposed construction adopts the specification's definition and, as described below, is consistent with the applicant's representations during prosecution of related applications.

The '556 patent consistently describes the sparse de-noising filter as a filter that exploits a sparse image model using an over complete set of linear transforms and hard thresh-holding. *Id.* The sparse de-noising filter creates numerous de-noised samples using "three steps: transform; transform coefficients threshold; and inverse transform." '556 Patent at 2:14-16. Then, de-noised samples are "combined using weighted averaging at every pixel." *Id.* 2:16-21. The process is illustrated in Figure 5.

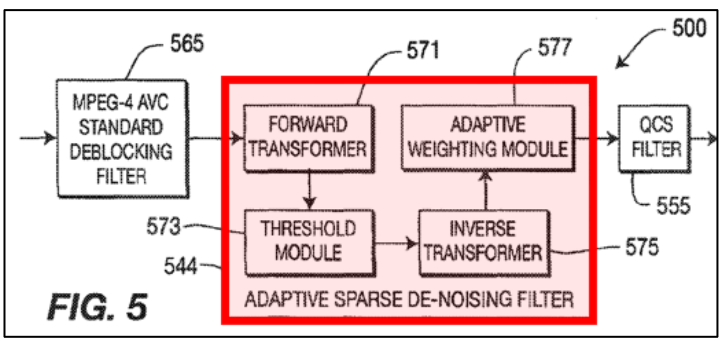


FIG. 5

The specification explains each step in detail. First, the sparse de-noising filter determines "an over *complete transform* set H_i, i=1, . . . , M." '556 Patent at 13:24-25 (emphasis added). Next, the filter determines "a *threshold* γ." *Id.* at 13:36. Finally, the sparse de-noising filter applies "the adaptive weighting method to combine the outcome of the inversed transforms." *Id.* at 13:43-44; *see also id.* at 11:17-24 (same). The specification of the '556 patent does not describe or contemplate any embodiment of an "adaptive sparse de-noising filter" that does not conform to this approach.

B. "adaptive sparse de-noising filter"

IDC Construction	Lenovo Construction
Plain and ordinary meaning	sparse de-noising filter for performing a second pass to reduce noise, which is not a deringing filter, that can adjust its own parameters automatically; Alternatively, a filter which exploits a sparse image model using an over complete set of linear transforms and hard thresh-holding, which is not a deringing filter, that can adjust its own parameters automatically.

The parties dispute that "adaptive" should be construed to mean "that can adjust its own parameters automatically," or more narrowly as "that can adjust its own parameters according to the image region" (as IDC has proposed is the plain meaning in Inv. No. 1373).

The specification of the '556 patent confirms that "adaptive" connotes "automatically": "The nonlinear de-noising filter *automatically* becomes high-pass, or low-pass, or band-pass, and so forth." '556 Patent at 2:10-14 (emphasis added).

IDC proposed "plain and ordinary" meaning construction in Inv. No. 1373 requires the sparce de-noising filter to "adjust its own parameters according to the image region," which is unduly narrow and does not encapsulate the broad range of adaptability described in the '556 patent or known by POSITAs. As used in the '556 patent, the term "adaptive" encompasses

adjustments to parameters based on a variety of inputs, not limited to the image region alone. The patent explicitly describes how a sparse de-noising filter can adapt based on, for example, "non-stationary image statistics," *id.* at 2:04-09, and the "number of non-zero coefficients" in the sparse representation, *id.* at 13:53-56. Furthermore, the patent details how the sparse de-noising filter's threshold level (γ) can be automatically set based on inputs like the "quantization parameter as well as to the sequence content." *Id.* at 11:64-66. The patent describes that the threshold level can be set at different levels of abstraction, such as slice, picture, or frame level. Conceivably, if the threshold level is set at the picture or frame level, the filter would not be adjusting to any aspect of the image "region" specifically but might instead be uniformly applied across the image. *Id.* at 12:01-35. Moreover, a POSITA could readily conceive of various other inputs that might influence an adaptive sparse de-noising filter to automatically adjust its own parameters, which the patent explicitly acknowledges. *Id.* at 12:39-42.

Constraining the term "adaptive" to adjustments based solely on image region not only misinterprets the patent's broader technical context but also unduly narrows its scope. This narrow interpretation fails to account for the patent's comprehensive description of the various inputs on which it bases its parameters. Lenovo's construction, on the other hand, emphasizes that the sparse de-noising filter is adaptive in nature because it automatically adjusts various parameters without the need for specific intervention, while not arbitrarily limiting the inputs on which the filter basis its adaptive behavior. Such a construction is more accurately aligned with the technological realities of the sparse de-noising filter, which may be designed to respond to a wide array of inputs, as described in the patent and understood by those skilled in the art. *See* Ex. B at ¶¶ 156-57.

VII. CONCLUSION

For the reasons discussed in greater detail below, Lenovo respectfully request that the ALJ adopt their proposed construction of each term.

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Respectfully submitted,

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